Office Work Instruction

HOWI 7120-Y003 Baseline
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Subject: Formulate and Approve Flight Missions

OFFICE WORK INSTRUCTION

FORMULATE AND APPROVE FLIGHT MISSIONS

(Conforming to ISO 9001 Quality System Requirements)

DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		2/1/99	

PREFACE

The NASA Office Work Instruction (OWI) for Formulate and Approve Flight Mission documents the tasks and activities in conformance with the International Organization for Standardization's (ISO) 9001 requirements for quality systems. The manual supplements the NASA Strategic Plan, Strategic Management Handbook, and other higher level NASA directives, which form the basis for how NASA conducts business.

This OWI is not intended to duplicate or contradict any other NASA policy, procedures or guidelines, which currently exist. As such, the OWI will reference prevailing documents where a topic is addressed and existing coverage is deemed adequate. Additional information provided within is intended to supplement existing documentation regarding Headquarters (HQ) implementation of strategic and program/project management, as well as HQ conformance with the ISO 9001 Quality Management System (QMS) requirements.

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1.0 PURPOSE

This OWI provides instructions on what must be done to formulate NASA Earth Science Enterprise (ESE) flight missions. It describes the activities that are performed for a typical mission formulation effort. The OWI describes what is to be accomplished by the process, not how the work is to be performed. Program Coordinators are expected to apply their experience, expertise, professional contacts, and knowledge in order to successfully conceptualize, solicit, and plan science and applications-driven flight missions.

2.0 SCOPE AND APPLICABILITY

2.1 Scope. This work instruction describes activities typically performed by a team of Enterprise and Agency personnel coordinated by the Program Planning and Development Division of the NASA ESE when formulating science and applications-driven flight missions. Flight mission formulation begins with the packaging of Earth science and/or applications requirements into sets. These requirements sets form the basis for conceptualizing a flight mission, and developing its architecture. A two-step solicitation approach is then followed which results in a "preferred" response. Level I program requirements are developed, a new or updated Program Commitment Agreement (PCA) is produced, and a lead center assigned. The process is completed when the ESE Associate Administrator (AA) and NASA Administrator sign the PCA.

This work instruction represents a tailoring of NPG 7120.5A, NASA Program and Project Management Processes and Requirements, to support a process that is modeled after the Earth System Science Pathfinder (ESSP) method of formulating a flight mission. Fundamentally, this approach reaches out to the science community for ideas on how best to meet the science and/or applications requirements and involves a two-step solicitation process.

2.2 Applicability. This work instruction for Formulate and Approve Flight Mission applies to the NASA Office of Earth Science (OES, Code Y) offices and divisions. The Associate Administrator for Earth Science is responsible for maintaining this document. The controlled version of the manual is available on the World Wide Web (WWW) via the HQ ISO 9000 Document Library for the ISO 9000 QMS at http://hqiso9000.hq.nasa.gov. Any printed version of this OWI is uncontrolled (reference: HCP 1400.1, Document and Data Control). Proposed revisions of this manual will be accomplished by following HOWI 1410-Y015 (Approve Quality Documents).

3.0 DEFINITIONS

In general, the definitions given in ISO 8402 apply. Appendix B of the *Earth Science Enterprise Management Handbook* provides additional ESE-specific terms and definitions.

4.0 REFERENCES

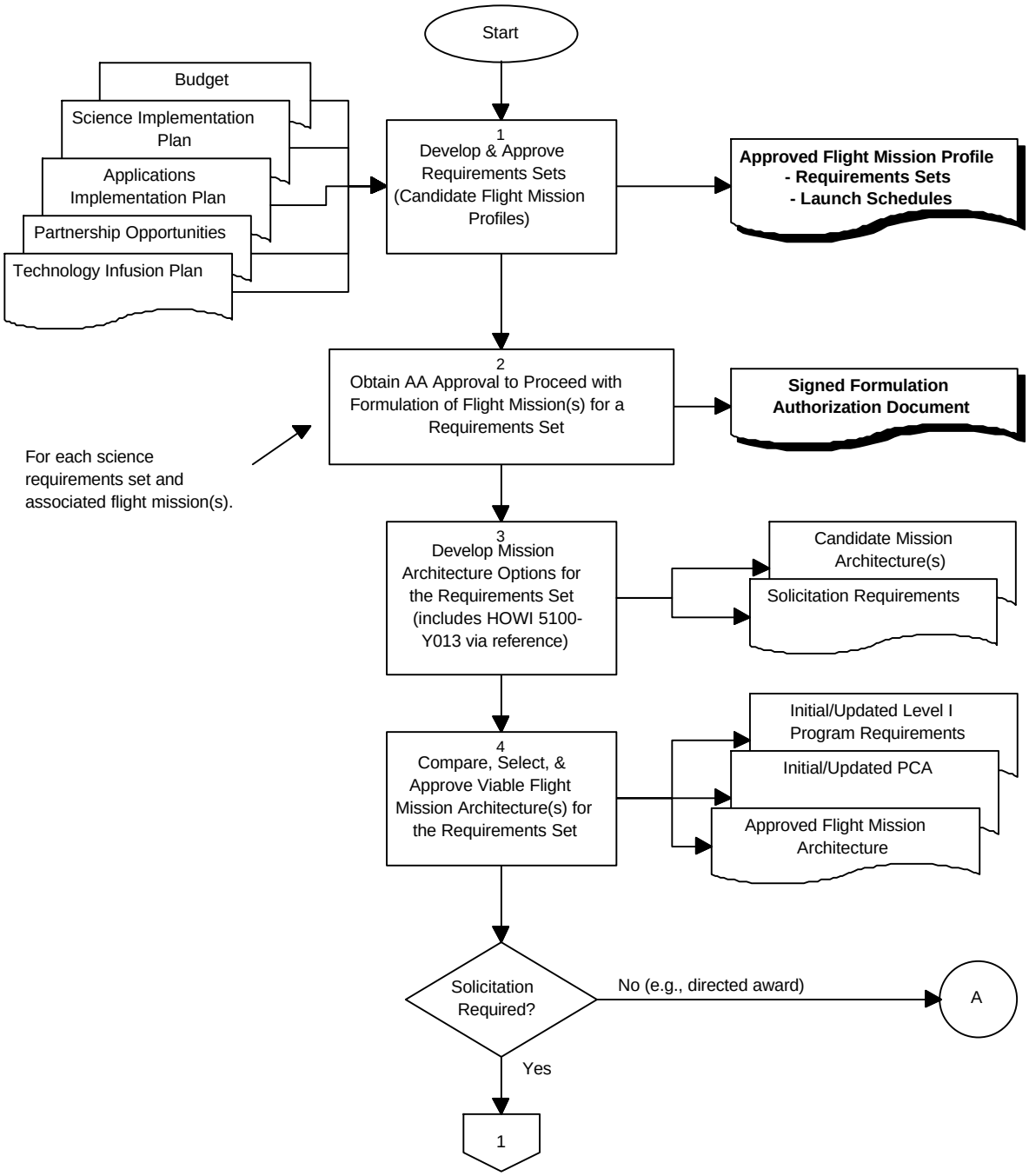
The following documents contain provisions that, through reference in this OWI or in policy or procedure documents, constitute the basis for the documented procedure:

NFS Part 1835	NASA FAR Supplement, Part 1835, Research and Development Contracting
NFS Part 1872	NASA FAR Supplement, Part 1872, Acquisition of Investigations
NPD 1000.1	NASA Strategic Plan

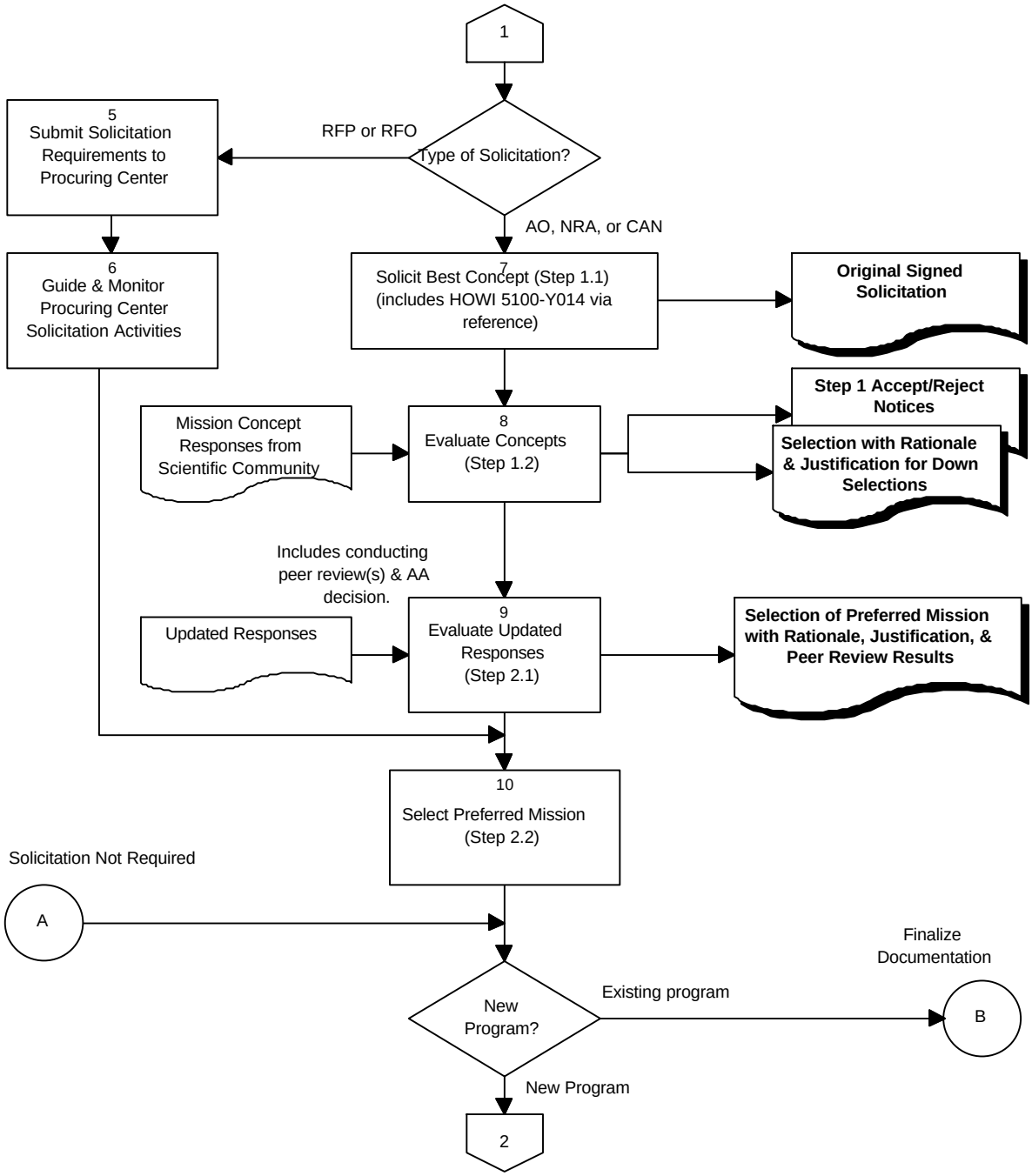
NPG 1000.2	NASA Strategic Management Handbook
NPG 5800.1D	Grant and Cooperative Agreement Handbook
NPD 7120.4A	Program/Project Management
NPG 7120.5A	NASA Program and Project Management Processes and Requirements
ANSI/ASQC Q9001-1994	American National Standard, Quality Systems-Model for Quality Assurance in Design, Development, Production, Installation, and Servicing
ANSI/ASQC 8402:1994	Quality Management and Quality Assurance - Vocabulary
NPD 8730.3	NASA Quality Management System Policy (ISO 9000)
NHB 1101.3	NASA Organization Handbook
HOWI 5100-Y013	Select Proper Solicitation Instrument
HOWI 5100-Y014	Obtain Approval for Release of Solicitation Instrument

5.0 FLOWCHART

The following flowchart depicts the procedure described in Section 6. Outputs in boldface type represent the quality records listed in Section 7.



5.0 FLOWCHART (Continued)



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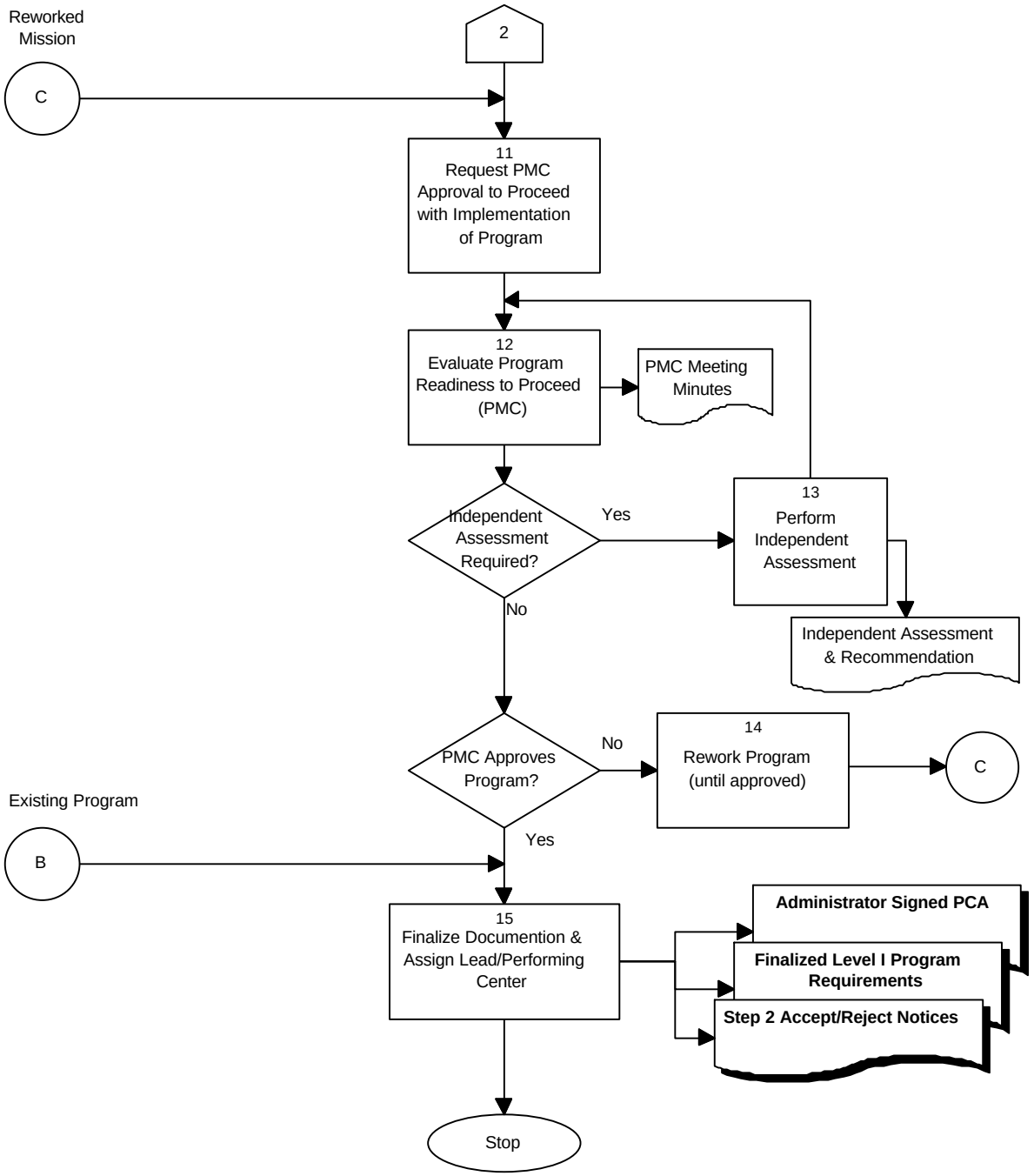

6.0 PROCEDURE

The following table describes the flowchart of Section 5.

Actionee		**Action**
Division Directors coordinated by YF	1	Develop and Approve Requirements Sets (Candidate Flight Mission Profiles). Science and applications requirements -- developed during the enterprise strategic planning process and documented in ESE Science and Applications implementation plans -- drive formulation of flight programs. Packaging related requirements into sets for flight is tempered by the science and applications requirements, technology schedules published in the *Technology Infusion Plan* (produced by the Manage ESE Technology Development Program process), and budgets. In essence, the flight mission profile represents a synchronization of requirements sets with technology schedules and budget availability. The Division Directors prepare a briefing of requirements sets which is given to the ESE AA. The ESE AA determines the acceptability of the requirements sets and approves them for inclusion in a flight program. The ESE AA relies heavily on advice from the Division Director when making these decisions. Note that a program is a collection of related flight mission(s) that in turn address specific requirements sets.
Development Team (YF, YS, YO, YB, IY, H, and G)	2	Obtain AA Approval to Proceed with Formulation of Flight Mission(s) for a Requirements Set. For each requirements set approved during the previous activity (Activity 1), the Directors of ESE assign a development team. As a minimum, the development team includes a Program Scientist from the Research Division (YS) and/or an Application and Outreach Executive from the Applications Research and Outreach Division (YO), the Program Coordinator from the Program Planning and Development Division (YF), the Business Division (YB), an International Affairs specialist from Code IY, a procurement specialist from Code H, and legal council from Code G. The team begins to define the concept for the mission(s). As part of this effort, the development team associates mission(s) to a specific ESE program/project. **In some cases, new missions are attached to an existing program. In other cases, a new mission may become a new program.** The team also begins to define the purpose and objectives of the mission(s), relate the objectives of the mission(s) to the ESE goals, prepare overviews for the mission(s), define who are the customers for the mission(s), and specify who has responsibility and authority for the mission(s). All of this is preparatory work for later development or update of the associated program's Program Commitment Agreement (PCA). The team tailors the NASA program management process defined in NPG 7120.5A, *NASA Program and Project Management Processes and Requirements*, to meet the unique needs of the mission(s) being

formulated. This tailoring is incorporated into the program's PCA later in the formulation process.

The team continues the conceptualization activity by scoping out the rest of the mission formulation phase, identifying program time and cost constraints, and estimating the funding requirements for the mission formulation phase. The team also identifies other enterprises, centers, and external partners who will participate in the program.

The tasks contained within this activity lead to the development of a draft Formulation Authorization Document for the proposed mission. Refer to NPG 7120.5A for a listing of what should be included in a Formulation Authorization Document.

The development team presents the draft Formulation Authorization Document to the ESE AA who determines whether or not to proceed with additional mission formulation efforts. If authorization to proceed is denied, the mission concept is either reworked based on guidance received from the ESE AA or planning ceases. The ESE AA indicates approval to proceed by signing the Formulation Authorization Document. This authorizes the team to continue the formulation effort and expend the formulation resources identified in the Formulation Authorization Document.

Development Team 3 Develop Mission Architecture Options for the Requirements Set. With the signed Formulation Authorization Document as authorization to proceed, the development team conducts a series of tasks designed to develop candidate mission architectures which represent mission implementation options. One of the mission architectures will become the desired mission architecture documented in the PCA and defined by the NASA HQ Level I program requirements for that mission (see Activity 4).

The team or its designee begins the activity of developing candidate mission architectures by identifying or assessing the following: partnership opportunities, technology readiness schedules, commercialization opportunities, data system needs and issues, environmental issues, and life-cycle cost (LCC) elements (specific cost estimates are developed later in Activity 4). This information, together with the requirements sets, the flight mission profiles, and the *Technology Infusion Plan,* enable the team to develop Level I program requirements for the mission (NASA Headquarters requirements).

The team then identifies risks and defines appropriate acquisition strategy options for each candidate mission architecture. The acquisition strategy would indicate if the solicitation was to be a Request for Proposals (RFP), Request for Offer (RFO), a NASA Research Announcement (NRA), an Announcement of Opportunity (AO), or a Cooperative Agreement Notice (CAN). If the solicitation were to be an RFP, then the award instrument would be a contract. The award instruments for an NRA can be a cooperative agreement, grant, or contract. For an AO, the award instrument can be a grant or a contract.

Reference HOWI 5100-Y013 (Select Proper Solicitation Instrument)

		for more detail on selecting an appropriate solicitation instrument. The solicitation requirements sent to HOWI 5100-Y013 may consist of any combination of science, applications, or technology requirements derived from the *Science Implementation Plan*, *Applications Implementation Plan*, or the *Technology Infusion Plan*.
Development Team ESE AA	4	Compare, Select, and Approve Viable Flight Mission Architecture(s) for the Requirements Set. The development team then evaluates and compares the various candidate mission architectures using the information generated in the previous activity. Additionally, the team develops life-cycle cost estimates for each architecture. These architectures and cost estimates are often developed using mission design capabilities located at NASA centers. These cost estimates are used in the comparison among candidate architectures. The comparison results in recommended mission architecture(s) that are presented to the ESE AA by the Program Coordinator. If the ESE AA approves the mission architecture(s), updates existing or prepares new Level I documentation (PCA, requirements, etc.) for that mission. Should the ESE AA reject the proposed mission architecture, the activity cycles back to the step where the development team formulates candidate mission architectures and repeats the intervening steps. Refer to NPG 7120.5A for listings of what should be included in a PCA. The Level I program requirements for the mission represent the core NASA HQ requirements. These requirements will be used in the Oversee and Evaluate Flight Program process to determine if the Lead or Performing Center is successful in accomplishing the mission. At a minimum, these Level I requirements include the mission objectives, the PCA technical performance requirements, the mission schedule, and the total life cycle cost. If the acquisition strategy articulated in the approved mission architecture requires a solicitation, then the process proceeds to either Activity 5 (Submit Solicitation Requirements to Procuring Center) or Activity 7 (Solicit Best Concept). The path is through Activity 5, if the solicitation is to be done via an RFP or RFO. For Announcement of Opportunity (AO); NASA Research Announcement (NRA); and Cooperative Agreement Notification based solicitations, the process flow is through Activity 7. If no solicitation is required and the mission(s) represent a new Program, the process skips to Activity 11 (Request PMC Approval to Proceed with Implementation). An example of such a skip might occur in the case of a directed award.
Development Team	5	Submit Solicitation Requirements to Procuring Center: For RFP or RFO-based solicitations, the development team relies on a NASA center to write and issue the RFP/RFO, as well as evaluating responses from offerors. The development team provides the NASA center with the mission requirements, a solicitation schedule, and solicitation funding constraints. ESE normally retains responsibility for making the actual selection, however (see Activity 10).
Development Team	6	Guide and Monitor Procuring Center Solicitation Activities: The

development team monitors the NASA center's solicitation process to ensure the solicitation schedule and cost constraints are being honored. Where appropriate and needed, the development team also provides guidance to the NASA center.

Development Team 7 Solicit Best Concept (Step 1.1). For NRAs, AOs, and CANs, ESE retains responsibility for generating the solicitation, releasing it, and evaluating responses. This work instruction describes a two-step solicitation approach (Activities 7 through 10). The philosophy behind this two-step approach is to lessen the resource burden on proposing institutions by relying on the scientific and technology communities to develop, assess, and propose technological solutions to mission requirements without preparing full cost proposals, and then obtaining comprehensive proposals (including cost) from a reduced set of offerers screened by science and technology peer review teams.

Depending on the circumstances and mission architecture option, the development team may tailor the solicitation and evaluation steps. For example, selection of a full-blown science or applications mission may require the full two-step process. In contrast, the mission for a single instrument or measurement capability may be defined well enough or the need sufficiently urgent that a one-step approach is appropriate. This decision will be made on a case-by-case basis.

Using the initial PCA, initial Level I program requirements for the mission, and other information developed in the previous activities as start points, the development team begins to prepare a solicitation that asks the science and technology communities for approaches that satisfy the mission's program requirements. The remainder of this work instruction describes the full two-step solicitation approach.

In the first step, the development team solicits ideas from the broader scientific and technical communities on how best to meet the mission’s goals, objectives, and requirements. When soliciting concepts, the development team begins by defining proposal assessment criteria. Generally, the evaluation criteria includes the following: (1) the scientific and technical merit of the proposal, (2) the relevance of the proposal to the program/project’s stated objectives and requirements, (3) the competence and experience of the offerer, (4) the realism of the proposal, (5) the proposed cost, and (6) the management approach proposed.

This solicitation also provides instructions for offerors who pass the first evaluation (see Activity 8). When preparing updated responses to be considered in the final evaluation (see Activity 9), offerors will refer to these instructions.

The development team also merges technology criteria that it deems necessary for a successful mission with the proposal assessment criteria to form the required step 1 solicitation documents. Approval to release the solicitation is done in accordance with HOWI 5100-Y014 (Obtain Approval for Release of Solicitation Instrument). If the ESE AA requests changes, the development team makes the changes.

At roughly the same time, the team selects a peer review panel that will evaluate responses (Activity 7). The peer reviewers normally are recognized experts. They may be from NASA, other Government agencies, universities, or the commercial sector. When selecting peer reviewers, the Program Coordinator is responsible for ensuring conflicts of interest are avoided.

The ESE AA is designated as the selection official. The development team publicizes and releases the best concept solicitation in accordance with the Federal Acquisition Regulations (FAR) and the NASA FAR Supplements. A synopsis of the solicitation in the Commerce Business Daily (CBD) and on the NASA Acquisition Internet Service (NAIS).

Development Team and Peer Reviewers	8	Evaluate Concepts (Step 1.2). Offerers from the scientific and technical communities generate proposals. These are intended to be brief proposals that outline how the offerers would meet the mission requirements. These responses are received by the peer review panel who screens the proposals for relevancy and feasibility. The peer review panel discusses the scope, strengths, and weaknesses of the various proposals. The proposals are graded in accordance with the evaluation criteria and a consensus is sought from the committee. The results of the peer review panel's evaluation are documented and presented to the ESE AA as strengths and weaknesses of each proposal with rationale and justifications. The ESE AA then chooses a set of preferred responses. The successful offerers and those offerers whose proposals were not chosen are notified via formal letter signed by the AA.
Development Team and Peer Reviewers	9	Evaluate and Select Preferred Mission (Step 2.1). The offerers submit updated responses that contain more detail and are more comprehensive including full cost information. They contain the results of mission trade-off studies, environmental assessments, platform and launch services availability assessments, assessments of ground data service options, and data availability assessments (e.g., Is this mission the only way to get the data?). The proposals also indicate what technology will be incorporated and the readiness of the technology. Tentative launch and partnership agreements will be documented. The proposals are expected to include estimated mission life-cycle costs as well. The development team distributes the expanded responses to the peer review panel. As before, the peer review panel chair summarizes the responses for presentation at a meeting of the combined peer review panel. The Panel Chair, member of ther Development Team, reconvenes the peer review panel to discuss the proposal evaluations. The peer review panel discusses the scope, strengths, and weaknesses of the various proposals. The proposals are graded in accordance with the evaluation criteria and a consensus is sought from the committee. The Panel Chair documents the results of the peer review panel's

evaluation for presentation to the ESE AA.

ESE AA	10	Select Preferred Mission (Step 2.2): Evaluation results from the peer review panel or the procuring NASA center, depending on which solicitation path was pursued, are presented to the AA as strengths and weaknesses for each proposal with rationale and justification. The ESE AA selects the preferred mission profile. If the new mission is an addition to an existing program, the flow proceeds to the Activity 15 (Finalize Documentation and Assign Lead/Performing Center). In the event, the mission results in a new program, then the flow goes to Activity 11 (Request PMC Approval to Proceed with Implementation) and a set of evaluation activities by the PMC.
Program Coordinator	11	Request PMC Approval to Proceed with Implementation. The Program Coordinator prepares Program documentation and reports for submission to the Program Management Council (PMC) for approval to proceed. This applies to new programs only. If the mission is not a new program, the process skips to Activity 15 (Finalize Documentation and Assign Lead/Performing Center).
PMC	12	Evaluate Program Readiness to Proceed (PMC). The PMC assesses the documentation provided by the Enterprise and determines if the program is consistent with Agency strategic goals and risk parameters. If risks are high, an independent assessment may be required. Based on this information, the PMC approves implementation of the Program as proposed or provides guidance. If either an independent assessment or other guidance is required, the PMC may re-evaluate the program's readiness for implementation after completion of those activities.
Independent Assessment Program Office (IAPO)	13	Perform Independent Assessment. The independent assessment essentially is a readiness assessment used by the NASA HQ PMC when deciding whether to grant approval to proceed with implementation. The Independent Assessment Program Office (IAPO) typically prepares a presentation for the PMC that identifies the members of the assessment team, provides an executive summary, describes the Program, and discusses readiness, technical, and resource status and issues. Upon completion of the independent assessment, the IAPO forwards the various evaluation and assessment results to the NASA HQ PMC (see Activity 12).
Development Team	14	Rework Program (until approved). The development team revises the Program as directed by the NASA HQ PMC. The Program Coordinator then again requests PMC approval to proceed (Activity 11). This cycle repeats until an acceptable Program is formulated.
Development Team	15	Finalize Documentation and Assign Lead/Performing Center. The ESE AA assigns a Lead or Performing Center and the development team finalizes the Level I program requirements for the mission. The development team also completes the update to the PCA (a mission specific appendix) and submits the PCA to the ESE AA for approval and signature. After the ESE AA signs the PCA, the AA discusses the

PCA with the NASA Administrator. If the Administrator signs the PCA, a letter from the ESE AA is prepared and sent to the Lead or Performing Center Director. This letter, along with the Level I program requirements for the mission, funding authorization (via Form 506 Green), and the signed PCA, authorizes the Lead or Performing Center to implement the flight mission. The lead or performing center is given authorization to administer the contract.

Additionally, the development team notifies the step 2 offerers as to which offer was chosen. The selection decision is then announced in the CBD and NAIS in accordance with the requirements of the FAR and NFS.

7.0 QUALITY RECORDS

RECORD IDENTIFICATION	OWNER	LOCATION	MEDIA ELECTRONIC / HARDCOPY	RETENTION	DISPOSITION
Approved Flight Mission Profile	YF Division Director	Program Planning and Development Division (YF)	Hardcopy	Retain for 2 years after completion, cancellation, termination, or suspension of the program.	Retire to Federal Records Center. Transfer to National Archives and Records Administration 10 years after subject event or when 25 years old whichever is sooner.
Signed Formulation Authorization Document	Develop-ment Team	Program Planning and Development Division (YF)	Hardcopy	Retain for 2 years after completion, cancellation, termination, or suspension of the program.	Retire to Federal Records Center. Transfer to National Archives and Records Administration 10 years after subject event or when 25 years old whichever is sooner.
Original Signed Solicitation	Develop-ment Team	Program Planning and Development Division (YF)	Hardcopy	Retain for 2 years after final payment.	Retire to Federal Records Center. Destroy 6 years after final payment.
Selection with Rationale and Justification for Down Selections	Develop-ment Team	Program Planning and Development Division (YF)	Hardcopy	Retain for 2 years after final payment.	Retire to Federal Records Center. Destroy 6 years after final payment.
Step 1 Accept/Reject Notices	Develop-ment Team	Program Planning and Development Division (YF)	Hardcopy	Retain for 2 years after final payment.	Retire to Federal Records Center. Destroy 6 years after final payment.

RECORD IDENTIFICATION	OWNER	LOCATION	MEDIA ELECTRONIC / HARDCOPY	RETENTION	DISPOSITION
Selection of Preferred Mission with Rationale and Justification	Develop-ment Team	Program Planning and Development Division (YF)	Hardcopy	Retain for 2 years after final payment.	Retire to Federal Records Center. Destroy 6 years after final payment.
Administrator Signed PCA	Develop-ment Team	Program Planning and Development Division (YF)	Hardcopy	Retain for 2 years after completion, cancellation, termination, or suspension of the program	Retire to Federal Records Center. Transfer to National Archives and Records Administration 10 years after subject event or when 25 years old whichever is sooner.
Finalized Level I Program Requirements	Develop-ment Team	Program Planning and Development Division (YF)	Hardcopy	Retain for 2 years after completion, cancellation, termination, or suspension of the program.	Retire to Federal Records Center. Transfer to National Archives and Records Administration 10 years after subject event or when 25 years old whichever is sooner.
Step 2 Accept/Reject Notices	Develop-ment Team	Program Planning and Development Division (YF)	Hardcopy	Retain for 2 years after final payment.	Retire to Federal Records Center. Destroy 6 years after final payment.